From pH strips to water pennies: *Teaching Science in the Blackstone River Watershed*

Michael and Janice Ferry
2001 Chafee Heritage Award
Woonsocket High School and
Mount Saint Charles Academy

Janice Ferry's thoughts as a science teacher at Mount Saint Charles in Woonsocket are often overshadowed by her gregarious husband, Michael Ferry, who is a science teacher at Woonsocket High School. When asked what she tries to teach about the Blackstone River, however, Janice is clear. "We try to teach a sense of stewardship," she says. "We want the students to learn that the river is like a living thing." Next year she expects to implement a multi-disciplinary course on the Blackstone River and its environs much like the one her husband initiated in the Woonsocket High School curriculum several years ago. "We want to teach the historical aspect of the River's water quality as well," she said. "What is that quality like today compared to what it was years ago, and what will students learn from that. I am very positive about this program because my students are from all over the Blackstone Valley and they will each bring a different perspective with them."

At Woonsocket High School, the Rivers Course offers integrated curriculum including history, math, science and English, and it has been so successful that there is a complementary "Rivers Club" at the high school as well. If there is an angle to get students interested in their local river, someone at Woonsocket High School has found a way to make it happen for the students. Presentations include poetry readings, T-shirts decorated in river flora and fauna designed in art class, skits titled "The Story of Poo" telling audiences of all ages what happens when dogs waste is not properly disposed of and other creative ventures have all been the result of dedication and hard work in developing a Blackstone River-based curriculum. The Woonsocket High School Rivers Study class itself recently visited an elementary school class in Lincoln to introduce younger students to what they have learned and to assist them with the hands-on aspects of effective water testing.

Michael and Janice Ferry were the 2002 recipients of one of the Chafee Heritage Awards. They not only teach students, but they teach other teachers who implement a similar curriculum in their schools. The next River Classroom teacher's workshop will be held from July 15th through 19th and Mike encourages all types of educators, scout leaders and volunteers to participate. Teachers benefit from becoming members of the Rivers Network and can then tap into its resources to bring special equipment and speakers into their classrooms.

There are many exciting projects being developed to bring the science of the Blackstone River Watershed to people far and near. The visionaries behind the Blackstone

Top, clockwise: Coopertown Brook, Douglas State Forest; Teachers attend a workshop about the river's resources to enrich their curriculum; school children collect samples from Broad Meadow Brook Wildlife Sanctuary.

REVOLUTIONS

A PUBLICATION ON THE JOHN H. CHAFEE BLACKSTONE RIVER VALLEY NATIONAL HERITAGE CORRIDOR

River Science, Education and Research Center (BRSERC) to be located on the banks of the Blackstone River at Central Falls Landing have just completed their mission statement and goals. They will next focus on developing a business plan that will allow the facility to host graduate science students who will help others with their field work and river-based projects. The Center will complement the River in the Classroom coordinated by the Blackstone Valley Tourism Council that already uses the Blackstone Explorer river boat docked at the Central Falls Landing. The site also hopes to link several water monitoring stations – from the headwaters at Broad Meadow Brook to the Central Falls station just before the river enters the Narragansett Bay — in order to monitor water quality the length of the Blackstone River.

There is a whole generation of students who are now growing up knowing the Blackstone River as a friend and integral part of their world.

The Explore & Discover Museum, Uxbridge, MA

There are "power-full" things going on at Uxbridge's Explore and Discover Museum on the Mumford River. As one of the Blackstone River's major tributaries, the Mumford was once home to numerous textile and manufacturing operations itself. Today, in the former Bernat Mill complex, Bruce Dean, an art teacher at Uxbridge High School, has found a way to combine the arts and sciences to intrigue the most skeptical of students. In fact, the Explore & Discover Museum received the 2001 Association of Science - Technology Centers $10,000 prize for its innovative efforts.

As part of the future River Classroom, Dean hopes that students will soon come face to face with a "low head hydro generator" that will show them how the river in front of them can be harnessed to produce electricity locally. Supplemented with a possible grant from the Massachusetts Renewable Energy Trust Fund, the generator could eventually produce enough electricity to supply two small residential homes. While the environs of the location clearly lend themselves to water quality testing, sport-based recreation and more, the site most importantly provides real life opportunities for students to experience the river in their back yard.

Dean hopes to eventually model photovoltaics, fuel cells and the traditional waterpower-based systems to demonstrate to students that they could actually produce their own energy. According to Dean, knowing that they could have some control over energy production could also influence students' values and significantly impact future community planning.

What's next for the Explore & Discover River Classroom? Dean expects to see students developing horticultural exhibits as well as a fish pond. There are also plans to enclose part of the low head hydro in clear plexiglass so that students can watch it operate. All of these projects focus on building messages that heighten community awareness. This summer's work will include developing creative partnerships with others in the Blackstone Valley and to apply to the Massachusetts Cultural Council to become a member of its Creative Schools program.

We try to teach a sense of stewardship.

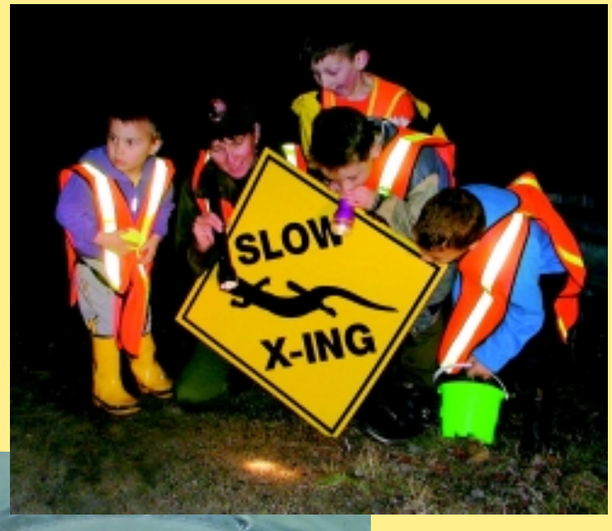
Janice Ferry

Above: Butterfly studies. Photo provided by Broad Meadow Brook Wildlife Sanctuary. Left: Park Ranger jack Whittaker explains Woonsocket's hydroelectric power plant to 5th grade students from Shaw Elementary School in Millbury..

Top center: Seniors from Whitinsville Christian School head down the Blackstone Canal at River Bend Farm in Uxbridge after instruction on paddling and safety by park rangers.

Forest ecology study. Photo provided by Broad Meadow Brook Wildlife Sanctuary.

Water quality testing by students from Harris School in Woonsocket.



Big Night:March 2002. Salamanders have help crossing roadways in order to reach their breeding pools.

Left: A spotted salamander depends on the annual occurance of these vernal pools.

Karen Mateleska, National Park Service Ranger John H. Chafee Blackstone River Valley National Heritage Corridor

"We want to educate about the natural resources in the Blackstone River Valley and to let them know that the river is becoming healthy once again. I focus on educating students about the macroinvertabrates or bugs that are indicators of the health of the river. While chemical testing gives us a "snapshot" of life in the river, the insects residing there have differing levels of tolerance to pollution. By moving up and down the river, we can determine the water's quality by the types of macroinvertebrates that we find at different locations."

Mateleska explained that, in most rivers, the headwaters (where the river begins) are usually cleaner than what one typically finds downstream. This is not the case with the Blackstone since a great deal of wastewater (treated and untreated) is flushed into the river far upstream in Worcester. Luckily, several tributaries empty into the Blackstone so that Mateleska and her students have found that the water quality above River Island Park in Woonsocket, RI, is surprisingly good. Manufacturing and treatment plants all along the river, as well as land development, all contribute to a very varied picture.

Students quickly learn that free living caddis flies, common stoneflies and water pennies are all healthy water indicators. Leeches and worms, however, are not. How do you teach students to correctly identify "icky" bugs? "To bring students directly to the river is often overwhelming," Mateleska admitted. "In conjunction with Audubon and other science programs, we are now reaching out to children in the Blackstone Valley as early as five years of age with a "tiered" learning system," she said. That graduated, integrated program introduces young ones to gummy, edible candy bugs and programs in subsequent grades teach students about the macroinvertebrates' ecosystems and their related interactions with the entire river. By the time these students reach high school, they are ready and able to do field experiences that not only identify the insects, but also combine other approaches that include biology, chemistry and other disciplines into water quality sampling and non-point source pollution impacts on the ecosystems with sophisticated equipment.

Massachusetts Audubon Society Targets Watershed Education

"Our major mission in the Blackstone River watershed is to help people understand the direct connection between land use and water quality, and that they individually can help improve water quality by changing their habits," is the mantra of Donna Williams, Advocacy Coordinator for Massachusetts Audubon Society's Broad Meadow Brook Conservation Center and Wildlife Sanctuary in Worcester. "All of us living in the Blackstone watershed are connected by water – what happens upstream affects folks downstream. Our goal is to dissolve political boundaries and get people to think like a river. And we start with students." Through such programs as the Blackstone River Watershed Education Project, Lake Quinsigamond Watershed Awareness Days, and the Blackstone Watershed Vernal Pool program, MassAudubon works in collaboration with many partners to help students bring this message home.

The Blackstone River Watershed Education Project, now in its tenth year, is a high-school water quality monitoring program that takes place in fifteen high schools throughout the watershed from Worcester to Pawtucket. On three Testing Days, three hundred students and teachers monitor the river and streams for dissolved oxygen, biochemical oxygen demand, phosphates, nitrates, pH, temperature and coliform bacteria, as well as macroinvertebrates. In the spring, they come together at Broad Meadow Brook for the Student Congress, where students from throughout the watershed present analysis and interpretation of their data, and give updates on programs they have initiated to help mitigate sources of pollution. They also do WORKshops, where they stencil "Do Not Dump – Drains to Broad Meadow Brook" on stormdrains, remove invasive species such as knotweed, and sample the brook for macros and water quality. By the end of the year, students actually do start to think like a river. This highly successful program is funded in part by the Blackstone Heritage Corridor.

All of Shrewsbury's seventh graders and some of Worcester's sixth and seventh graders come to Regatta Point State Park for Lake Quinsigamond Watershed Awareness Days. First the Project WET group activity "Hooks and Ladders" teaches them about anadromous fish life cycles and the obstacles they face to return to their native streams to spawn. Students then cycle through hands-on learning stations about the workings of watersheds, macroinvertebrates and water testing. The grand finale is a bucket brigade to stock the lake with twelve-inch rainbow trout, courtesy of the Massachusetts Division of Fisheries and Wildlife. Lake Quinsigamond and the Quinsigamond River is a major headwater tributary to the Blackstone: improving land use here, and everywhere, will help improve water quality. This program is sponsored by the Lake Quinsigamond Commission.

The Blackstone Watershed Vernal Pool program is a truly collaborative effort, the most visible component of which is the "Big Night Hot Line," a telephone tree of over 300 individuals willing to come out on the first warm rainy night in spring to serve as crossing guards to mole salamanders and wood frogs as they leave their upland burrows to breed in temporary ponds called vernal pools. The less visible component is the many workshops in schools and the community devoted to vernal pool identification and certification. Awareness, appreciation and action will help preserve this unique wildlife habitat that is in every watershed community.

These are some of the many programs that help protect the nature of the Blackstone watershed, starting with our youngest stewards.

RESOURCES

Blackstone Valley Explorer and RiverClassRoom
Blackstone Valley Tourism Council
Pawtucket, RI
401-724-2200

Massachusetts Audubon
Broad Meadow Brook Sanctuary
Worcester, MA
508-753-6087

EcoTarium
Worcester, MA
508-929-2700

Explore & Discover Museum
Uxbridge, MA
508-278-5616

The National Park Service
Rangers and River Navigator, Johanna Hunter can be reached at the John H. Chafee Blackstone River National Heritage Corridor
One Depot Square
Woonsocket, RI 02895
401-762-0250

The John H. Chafee Blackstone River Valley National Heritage Corridor is about to embark on a **Valley-wide trail/greenway inventory project.** A series of regional public workshops have been scheduled.

The Corridor hopes that the inventory leads to better trail connections between communities and their historical/natural resources. Wherever possible, these trails will be designed to interconnect existing public spaces, visitor centers, and historical infrastructure.

Residents, those with an interest in recreation and open space conservation, including individuals, organizations and municipal officeholders and personnel, are encouraged to attend.

For more information contact:
Mark C. Jewell
John H. Chafee Blackstone River Valley National Heritage Corridor
401 762-0250

MEETING SCHEDULE:

May 15, 2002 from 6-8:30pm at the Millbury Senior Center for the towns of Leicester, Worcester, Millbury, Grafton, and Upton.

May 29, 2002 from 6-8:30pm at the Northbridge Town Hall for the towns of Sutton, Douglas, Uxbridge, Northbridge, Mendon and Hopedale

June 5, 2002 from 6-8:30pm at Woonsocket City Hall for the towns of North Smithfield, RI, Woonsocket, RI, Millville, MA and Blackstone, MA.